

---

# FE515     R in Finance

---

FALL 2018 (PREVIEW VERSION)

*Instructor:*   Ziwen Ye

*Class time:*   Section A: M 10:00-12:00 Hanlon Lab 2  
                  Section B: M 14:00-16:00 Hanlon Lab 2

*Office:*        Altorfer 301

*Email:*        `zye2@stevens.edu`

*Office hrs:*    TBD

## Course Objectives

This course is designed for graduate students. Starting from 2018 fall semester, this course is extended to 2 hours each week. The section A and section B will teach different contents.

The section A is aiming at help students from Financial Engineering and Financial Analytics to get ready for core courses study. The content will cover some fundamental topics in the statistics, time-series, optimization programming R languages. As well as some basic applications in finance.

The section B mainly serves students from Business Intelligence Analytics, Finance and Information Systems. **Students from Financial Engineering and Financial Analytics are required to take section A.** The content will cover some fundamental topics in statistics, data visualization, basic applications in finance.

Upon completion the students will gain an understanding of the programming syntax and should be able to use R in any future courses.

## Textbook(s) and Materials

- Lecture Notes and Code
- *The art of R programming: a tour of statistical software design.* Norman Matloff, First Edition, 2011. ISBN-10: 1593273843, ISBN-13: 978-1593273842
- *An Introduction to Analysis of Financial Data with R.* Ruey Tsay, First Edition, 2012. ISBN-10: 0470890819, ISBN-13: 978-0470890813

## ACADEMIC INTEGRITY

**Undergraduate Honor System** Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution <http://web.stevens.edu/honor/documents/constitution.pdf>. More information

about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at

<http://web.stevens.edu/honor/>

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

*I pledge my honor that I have abided by the Stevens Honor System.*

**Reporting Honor System Violations.** Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at [www.stevens.edu/honor](http://www.stevens.edu/honor).

## Assignments and Grading Policy

The plan is to schedule 5 assignments for this semester. The assignments will due exactly before the next class. **All LATE SUBMISSION** will be punished unless you send me an email **BEFORE DUE** and get approved. If your submission passes the due for less than 24 hours, your highest score will be 67%; between 24 and 48 hours, your highest score will be 33%; after 48 hours this assignment will be graded as 0. If the assignments I give out is more than 5, the lowest grade will be dropped in final grading calculation.

For this course, all students will have the midterm and final exams. Both exams are 2 hours length and will be held during the class. As a coding class, we only test the coding skill from students. Therefore, both exams will be open book. Students can use any materials during exams (such as notes, Google search engine and etc.) to help them answer all questions. However, any communication tools (such as Skype, email and etc.) and tutoring websites are **NOT** allowed.

If students have any concern or questions regarding to the teaching contents and homework, they are encouraged to seek help from the instructor. Discussing homework with classmates are **prohibited** for this course. All code and reports must be written by yourself. Copying solutions from sources other than your brain is strictly forbidden.

This kind of behavior will be considered as academic dishonesty/misconduct and will be dealt with according to the Stevens honor board policy.

## **Grading Policy**

Assignments – 30%

Midterm – 30%

Final – 40%

Bonus – TBD (Bonus includes but not limited to attendance and bonus questions)

## **Useful Resources**

CRAN: <http://www.wikibooks.org>

R-help Info: <https://stat.ethz.ch/mailman/listinfo/r-help>

R-help Archive: <http://r.789695.n4.nabble.com>

Quick R: <http://www.statmethods.net>

## Course Outline (Section A)

Date	Topics	Assignments
8/27 L1	R basics(1) Data structures & Loops	
9/3	Labor Day, No Classes	
9/10 L2	R basics(2) Self-defined functions "apply" functions	A1
9/17 L3	R basics(3) Generating random variables Simulations	
9/24 L4	R basics(4) Date and time objects Plots	A2
10/1 L5	Download data through R: Bloomberg API, Yahoo API (Equity and option) DataScope Select data	
10/9 L6	Matrix format data calculation	
10/15 L7	Simple Linear regression	A3
10/22	Midterm	
10/29 L8	Introduction to time-series model	A4
11/5 L9	Newton's method and gradient descent	
11/12 L10	Volatility GBM and BS Model	A5
11/19 L11	Portfolio construction	
11/23 L12	Rmarkdown, R html & R presentation	A6
12/3 L13	Advanced Topic: High frequency data dynamics	
12/10	Final exam	

## Course Outline (Section B)

Date	Topics	Assignments
8/27 L1	R basics(1) Data structures & Loops	
9/3	Labor Day, No Classes	
9/10 L2	R basics(2) Self-defined functions ”apply” functions	A1
9/17 L3	R basics(3) Generating random variables Simulations	
9/24 L4	Plots and qplot Date and time objects	A2
10/1 L5	Download data through R: Bloomberg API Yahoo API (equity, option and advanced)	
10/9 L6	Return, moments	
10/15 L7	Simple Linear regression	A3
10/22	Midterm	
10/29 L8	Basic statistics	A4
11/5 L9	Newton’s method and gradient descent	
11/12 L10	Volatility GBM and BS Model	A5
11/19 L11	GGplot	
11/23 L12	Rmarkdown, R html & R presentation	A6
12/3 L13	Advanced Topic: Data visualizations and ANOVA	
12/10	Final exam	